

BURNING

Alternative to Traditional Precommercial Thinning

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Typical backing fire.

Where its seeds fall on bare ground in full sunlight, loblolly pine usually has no trouble re-establishing itself after a harvest. Unfortunately, from an economic viewpoint, this natural regeneration process is often too successful, resulting in overstocking. Species such as pines that regenerate primarily from seed can produce too many seedlings.

If timber profits are important land management objectives, then dense pine stands should be thinned when they are young. Thinning concentrates growth on the trees left behind and reduces the time they take to grow to a merchantable size. Unfortunately, this kind of thinning, called precommercial thinning, produces no income because it must be done before any of the trees are large enough to be merchantable. To maximize profits, landowners can either take preventive actions to avoid overcrowding or lower thinning costs for stands that are already too dense. This article will focus on lowering costs for the landowner by using backburning to thin pine stands.

Precommercial Thinning When Pines Are Too Dense

Numerous studies have shown that precommercial thinning of natural loblolly pine stands is a sound investment. Two methods of precommercial thinning are common. Mechanical thinning uses heavy equipment to mow wide strips, leaving narrow strips of pine or pine and hardwood saplings. The second method, called hand thinning, entails the use of string-trimmer-type saws to cut all trees except those preselected for size and spacing. Hand thinning gets the best results because it leaves an optimum number of desirable tree species; these trees are evenly spaced for better growth.

Although economic analyses show good returns from both of these thinning methods, the costs are relatively high.

Many landowners cannot afford this investment. Others are reluctant because there are risks that can negate or postpone the return on their investment. Per-



A dense stand (6,800 stems per acre) prior to burning.

haps landowners might be more willing to take the risk if the cost of precommercial thinning was lower.

Two studies suggest that the cost of precommercial thinning can be reduced with low-intensity prescribed burning.

These studies were done at USDA Forestry Science Laboratories in Macon, Georgia and Charleston, South Carolina.

Because of the natural characteristics of Southern pines to develop a range of sizes (ground-line diameter and height) early in stand life (by age three to six), careful use of backing fires can successfully thin dense stands. Burning kills many small trees but spares larger trees. The largest trees are often undamaged. They will later become the crop trees. Results of these two studies show that backing fires kill very few pine saplings with ground line stem diameters over 1.5 inches. Below this threshold size, the smaller a sapling, the greater its probability of being killed. Backing fires are slower and more expensive than other firing methods. However, they are effective and their cost is a fraction (5 to 15 percent) of the cost of mechanical or hand thinning.

The timing of burning is critical, but depends more on tree size than tree age or the season. The ideal time for burning is when enough trees reach 1.5 inches in diameter at the ground line to leave a fully stocked stand. Early tests of burning in stands with trees larger than 1.5 inches at the ground line were unsuccessful because low-intensity fires did not kill enough trees. In the Charleston study, the stands were four years old. However, the best age for burning can be as young as three years or as old as eight years as long as sufficient numbers of trees are 1.5 inches in ground line diameter. As might be expected, fires this close to the crowns of young trees will scorch the needles. It looks bad, but scorching usually does not kill pines. The main determinant of survival is ground line stem diameter.

Although these results are promising, widespread application awaits further testing under a range of conditions. Land managers who have training and experience with prescribed fire can play an important role in testing this method by applying it in limited areas.

Economic Analyses

The Charleston study applied five pre-commercial thinning treatments including burning and hand thinning to very dense stands (8,000 to 12,000 pine saplings per acre) at age four. Tree growth was measured until age eight when most of the trees were uprooted by



Five weeks after burning. The trees have experienced severe crown scorch, which caused some loss of growth the year following burning. This loss was only temporary and was compensated for in later years by the thinning effect.



The same area during the spring following burning. Scorched needles have fallen and new needles have emerged. Burning reduced the stand density to 2,850 stems per acre.

Hurricane Hugo. Economic analyses were conducted by projecting the eight-year-old stands forward to age 30. Growth projections and economic comparisons were done with GATWIGS, a computer growth simulation model developed at Auburn University. GATWIGS is based on data collected by the USDA-Forest Service Forest Inventory and Analysis unit in Asheville, North Carolina. The purpose of these economic

comparisons was to compare the two thinning treatments, not to predict actual income. It would be a mistake to compare these values with those of other forestry operations or other types of investments.

The economic analyses showed that both burning and hand thinning were good investments. Burning gave the highest internal rates of return (20.3 percent versus 13.0 percent for hand thinning), suggesting a greater return on each invested dollar. Both methods gave positive net present values (NPV), indicating that they are better choices than not thinning at all. The thinning method with the greatest NPV (indicating the most profit) depended on the discount rate used. At a discount rate of 4 percent, the NPV for stands thinned by hand was \$512.91 per acre, as compared to \$487.71 for stands thinned by burning. At the higher discount rate of 8 percent, hand thinning increased stand value (NPV = \$148.87 per acre) but not as much as burning (NPV = \$171.97 per acre). The low cost of burning, compared with the higher discount rate, made additional investment in hand thinning unnecessary.

Summary

Precommercial thinning of young dense loblolly pine stands can be a good investment. Hand thinning is expensive but it ensures that the best trees and the optimum numbers of trees are left standing. Prescribed burning looks promising and is much less expensive than hand thinning. However, burning allows very little control

of tree spacing, and its application is somewhat risky. It remains for land managers knowledgeable in the methods of prescribed burning to refine this promising field application. ♣

Adapted from an article first published in the September/October 1995 issue of *Forest Farmer* magazine.



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FALL 1996

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Alabama's TREASURED Forests

Volume XV. No. 4

FALL 1996

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COVER: Fall comes to Muckleroy Creek in St. Clair County. Photo by Wayne Ruple.

Alabama's TREASURED Forests (ISSN 0894-9654) is published quarterly by the Alabama Forestry Commission, 513 Madison Avenue, Montgomery, AL 36130. Telephone (334) 240-9355. Bulk rate postage paid at Montgomery, Alabama. POSTMASTER: Send address changes to: *Alabama's TREASURED Forests*, P.O. Box 302550, Montgomery, Alabama 36130-2550.

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